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**Pete Wilson  
Governor**

October 15, 1997

**Ms. Carol A. Yuge  
Deputy Director  
Lockheed Martin Corporation Environmental Safety & Health  
Burbank Program Office  
2550 N. Hollywood Way, Suite 305  
Burbank, CA 91505-1055**

**TASK 3 WORK PLAN AND SCHEDULE ADDENDUM, PHASE 1  
INVESTIGATION OF THE LEADING EDGE OF THE REDLANDS TCE  
GROUNDWATER PLUME (CLEANUP AND ABATEMENT ORDER NO. 94-37)**

Dear Ms. Yuge:

We have reviewed the above work plan and schedule addendum submitted on August 27, 1997, prepared by HSI GeoTrans, on behalf of Lockheed Martin Corporation. On March 26, 1997, Lockheed Martin proposed a conceptual scope of work for Task 3. The scope of work was not acceptable, and comments were provided to Lockheed Martin on May 12, 1997. On June 25, 1997, Lockheed Martin presented a revised scope of work, and on June 27, 1997, verbal approval for the revised scope of work was provided. This work plan is based on the revised scope of work.

The objective of the Task 3 investigation includes more accurately delineating the leading edge of the plume, monitoring the downgradient movement of the plume, and providing early warning monitoring wells for downgradient drinking water supply wells. The Task 3 work plan consists of installing six multi-port monitoring wells and associated piezometers for sampling groundwater and measuring water levels. Five of the multi-port monitoring wells are proposed to be located downgradient of Task 2 multi-port monitoring wells LMW-1 and LMW-2 (completed in February of 1997), and one is proposed to be located within the TCE plume upgradient of the leading edge, near California Street.

The boreholes for Task 3 will be drilled using the mud-rotary method. If fluid circulation difficulties arise during drilling, lost circulation materials are proposed to be used to assist in advancing to the proposed total depth. If the drilling supervisor determines that equipment or personnel safety are at undue risk due to unstable downhole conditions, it is proposed that the borehole may be terminated at the attained depth. A nominal 10-inch diameter borehole is anticipated for each location to allow for the installation of the 4-inch diameter wells. It is anticipated that each monitoring zone will consist of a 10-foot screened section. Screened intervals will be separated with annular seals to prevent movement of groundwater between the screened zones. Hydrostratigraphic data will be used as the key criteria for the selection of zones for monitoring. Units of sand and gravel that would serve as the primary pathway for groundwater flow and contaminant transport will be selected preferentially for groundwater sampling intervals. It is anticipated that each well will be advanced to approximately 700 feet and will contain 7 to 8 screened zones. It is anticipated that three ports will be positioned in Hydrostratigraphic Unit (HSU) 2 (near the water table,



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middle and lower), two in HSU-3 (middle confining unit) and three in HSU-4 (upper, middle and lower). The final well design will be specified after the geophysical logging is completed and lithologic and geophysical logs have been reviewed. If undue complications result or appear imminent from multi-port well construction, then alternative well construction may be implemented that results in conventional multi-level well clusters.

Geophysical logs will be completed in all boreholes to identify lithologies, correlate stratigraphy between holes and to determine the upper and lower limits of the HSUs. The geophysical logging methods to be performed will be dependent on site specific conditions. It is anticipated that resistivity (single point, 16-inch, 64-inch and guard), spontaneous potential, natural gamma, caliper and deviation logs will be run.

The proposed Task 3 work plan is approved with the following conditions:

1. If the drilling supervisor determines that equipment or personnel safety are at undue risk due to unstable downhole conditions and the borehole has to be terminated at the attained depth, Board staff should be notified immediately. Once notified, Board staff will review the drilling status and if it appears that further characterization of the aquifer in that specific area is crucial to this investigation, Board staff may require a second borehole to be drilled to the target depth in the immediate area.
2. HSU-4 should be fully characterized, since seven of the City of Riverside Gage Canal wells and four of the City of Loma Linda wells are screened in the middle and lower part of this unit. This water-bearing unit may require at least five sampling ports. The lowest port in this unit should be installed at the contact point with HSU-5, or some distance deeper in this unit, to monitor the possibility of contaminant transport to HSU-6 resulting from the pumping of existing water supply wells that are screened in HSU-6.
3. Lockheed Martin Corporation should prepare and be ready to submit a plan for alternative well construction (conventional multi-level well cluster) in the event that undue complications result or appear imminent from multi-port well construction.

Please submit your acknowledgement of the above conditions by October 27, 1997. Based on your proposed schedule, one month is necessary for finalizing access and obtaining permits for the new wells, conducting a field inspection and mobilizing for the field activities. Therefore, drilling should be initiated by November 15, 1997. You also anticipate that four and one-half months will be necessary to complete the drilling (using two drill rigs) and geophysical logging, and an additional one and one-half months will be necessary to install the multi-port system and obtain samples. Therefore, initial sampling results are expected to be available by May 1998. Data analysis and preparation of the final report is expected to take about four and one-half months. Therefore, the final report is expected to be submitted by September 1998. Board staff will be monitoring the field activities to determine if the drilling can be completed sooner than the projected four and one-half months. Also, considering that it is projected to take up to four and one-half months to submit the final report after the initial data is available, Lockheed Martin may be requested to perform additional work prior to submittal of the final report.



If you have any questions, please contact Robert L. Holub at (909) 782-3298 or Kamron Saremi at (909) 782-4303.

Sincerely,



Gerard J. Thibeault  
Executive Officer

cc: City of Loma Linda, Mr. Gary Forth  
City of Riverside, Ms. Zahra Panahi  
Victoria Farms Mutual Water Co., Mr. Sean Bradley  
The Gege Canal Company, Mr. Ross Lewis  
City of Redlands, Mr. Michael Huffstutler  
Norton Air Force Base, Mr. Thomas Bartol  
USAWRA, Mr. Eugene McMeans  
USEPA, Mr. Kevin Mayer  
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